Disk Scheduling

1) Questions:

Q) The maximum amount of information that is available with one positioning of the disk access arm for a removable disk pack (without further movement of the arm with multiple heads) is:

A cylinder of the disk

Q) Disk requests are received by a disk drive for cylinders 5, 25, 18, 3, 39, 8, and 35 in that order. A seek takes 5 ms per cylinder moved. How much seek time is needed to serve these requests if serviced in the order that they are received (FCFS)? Assume that the arm is at cylinder 20 when the last of these requests is made with none of these requests yet served.

FCFS (do nothing) :

reasonable when load is low
long waiting time for long request queues

Order: (20), 5, 25, 18, 3, 39, 8, 35
Seek: 15+20+7+15+36+31+27 = 151 cylinders, 755 ms.

SSTF (shortest seek time first):

minimize arm movement (seek time), maximize request rate
unfairly favors middle blocks

Order: (20), 18, 25, 35, 39, 8, 5, 3.
Seek: 2+7+10+4+31+3+2 = 59 cylinders, 295 ms.

SCAN (elevator algorithm):

service requests in one direction until done, then reverse
skews wait times non-uniformly (why?)

(assume 19 accessed before 20, max track is 40)
Order: (20), 25, 35, 39, (40), 18, 8, 5, 3.
Seek: 5+10+4+1+22+10+3+2= 57 cylinders, 285 ms.

LOOK:

Like scan but doesn't go to the end of the disk

(assume 19 accessed before 20):
Order: (20), 25, 35, 39, (40), 18, 8, 5, 3.
Seek: 5+10+4+21+10+3+2= 55 cylinders, 275 ms.

Q) If a disk has a seek time of 20 ms, rotates 20 revolutions per second, has 512 bytes per sector, and each track has a capacity of 1536 bytes, then the total time required to access one sector is:
Summary:
Seek Time: 20 ms
Rotation speed: 20 RPS = 50 ms/rotation
1 Block = 512 bytes
1 track = 1536 bytes

Let *Rev* = 20 revolutions per second. *N* = number of words per track. Let *b* = number of words per block. Note: 1/20 sec = 50 ms.

First seek the track, rotate half-way on that tack on the average, and then read the data. So:

AccessTime = Seek + 1/2 *(1/Rev) + (b/N) * (1/Rev)
= 20 ms 0.5 * 50 ms + 512/1536 * 50 ms
= 20 ms + 25 ms + 16.6ms =61.6 ms.

2) Seagate Drive Worst Case Bandwidth Example.

3) Don't ask.